Corn Breeding on a Large Scale as Illustrated by Experience

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FARMERS AT THE AUCTION SALE OF PRIZE CORN SOLD ON THE NEBRASKA STATE FARM DURING THE MEETING OF THE NEBRASKA CORN BREEDERS' ASSOCIATION.

FIRST PRIZE CORN AT THE NEBRASKA STATE CORN SHOW—SOLD AT AUCTION TO O. E. MICKEY OF OSCEOLA, NEB., FOR $1 PER EAR, OR APPROXIMATELY $80 PER BUSHEL.

MORE attention is being paid to corn breeding now than ever before. Investigation has demonstrated that corn breeds true to type, that it is possible to improve the yield in any field on which the maximum is not grown, and that by a little attention to the selection of seed the farmer can put many more bushels into his crib from the same number of acres. In this light the following article from J. Dwight Funk is of great importance:

Corn breeding, perhaps more than the breeding of any other plant, presupposes the application of endless and technical detail, and to do this on a large and yet practical scale infers the conducting of a mammoth enterprise in a small way. However, with time as the immediate and connecting cog, the corn plant is so abundantly prolific that great quantities of the strain originating from a single kernel can be produced in a few years.

The successful breeder of plants will make as exhaustive a research for the proper environment for the individual as possible. He must always bear in mind that in the growth and development of an individual there are two influences or principles at work. These may be called inherent and external influences. The inherent influence is transmitted through generation after generation of ancestors and displays its force in anticipated characteristics.

Hardly less important is the external influence which is more apparently under the control of man. The environment of the plant must be such that it will give full play for the development of all inherent tendencies.

The selection of the plots of ground used for breeding purposes is thus made important. A fertile, well cultivated plot of some three or four acres should be found where plant food and opportunity for growth are equal throughout. These plots may be called breeding blocks. However, it is with the inherent tendencies and characters that the corn breeding must deal. It is within the scope of every corn grower to better the immediate conditions for growth of the corn plants.

Principles in Corn Breeding.

The fundamental object in corn breeding is utility. Obviously of greatest importance is yield. But there are other qualities to be sought, such as maturity, construction of stalk, amount of foliage, a minimum tendency to sucker and that which is of much importance, standing ability. The task of the breeder is to identify strains of corn in which inherent tendencies are for utility, in which great power of production is transmitted to the progeny. Within this strain or family he will find great variation. He must work for the elimination of all weak members and control and direct the life forces of the best individuals into beneficial and prolific channels. The influence exerted by both parents must be controlled. He must deal not only in a general way with the performance of the family, but directly with the performance of the immediate parents. Then, having produced an individual within a strain of marked ability, whose sire is of equal merit, he must propogate this seed in confinement—that is, keeping it by itself, individualize it; always, however, preventing self-fertilization of the seed intended for breeding purposes.

Corn thrives under the condition of open or cross fertilization, but there is a great chance of self-fertilization, under which condition it hastily retrogrades. To eliminate the possibility of any such disastrous results the seed intended for breeding purposes must be detasseled.

The Selection of Varieties.

Having chosen the plot of ground for the breeding block, then follows the selection of a variety or varieties, if his facilities for keeping them separated are adequate. In the selection of varieties he should procure those that had already proven their merit. Within the variety some eighty ears should be chosen for breeding purposes. Several qualities should govern this selection, especially uniformity of ears and kernels and the capacity of the ear (by this I mean size of ear, depth of kernel, in fact, a great amount of grain).

The eighty ears should each be given a number, which is entered in a record book along with other data which describes the apparent characters of the breeding ear. This data should be the length and circumference of the ear, the depth of kernel, the weight of the ear, the weight of the cob; the difference of these last two mentioned points gives you the amount of grain.

We will now call these breeding ears mother ears. Each mother ear is planted in a single row of the breeding block. Each row represents the progeny of one mother ear. In shelling the mother ear for planting one-third of the rows should be left on the cob, and this with an attached label identifying it, should be preserved in such condition that the germination of the remaining corn is not impaired. The rows of the block are numbered as entered in the record of the ear.

Cutting Out Undesirable Rows.

It is during the growing season that a great deal of the elimination of undesirable rows should be made. Or rather, rows showing such characteristics should, at the end of the season, be discarded. Careful observation of all the characteristics in growth should be made of all the rows. First the germination should be counted immediately after the corn comes through the ground. The vigor and strength of growth should be noted. The color, amount of foliage and construction of the stalk. The tendency of the row to sucker should be carefully entered in the record of each mother ear. You see this record is to be her performance record. To prevent self-fertilization one-half of each row should be detasseled and the breeding ears for the next year selected only from the detasseled stalks.

In detasseling alternate the ends of the rows upon which this is performed. For instance, detassel the north end or half of all the odd numbered rows and the south half of all the even numbered rows. In this way you are using each breeding ear as both sire and dam in your breeding block. This work requires strict attention, for no tassels should be allowed to shed a particle of pollen which is produced in the dam end of the row. The tassels unjoint readily when they are out of the leaves some three or four inches. They should never be cut off. This injures the stalk too much. The plant will be injured enough at best. Just before harvest time give the block a thorough inspection for maturity and note the same in each row in its record.

Four Divisions of Progeny.

In harvesting make four divisions of the progeny gathered from each row, namely, the ears gathered from the standing stalks of the tasseled end; second, the ear from the fallen stalks of the tasseled end; third, the ears from the standing stalks of the detasseled end. Each of these divisions should be weighed separately and the number of ears in each counted. The sum of the four weights will give the corn production of the mother ear.

Now, all of these rows should have been equal in length and the same number of kernels planted by hand in each hill. At the time of maturity inspection the exact number of stalks and hills in the row should be taken. If the hills are planted three and one-half feet each way there will be 3,556 hills in an acre; having the corn production per hill, the rate of yield per acre can be easily obtained.

The breeding corn should be saved only, the third division previously mentioned, namely, from the standing detasseled plants.

In your selection of what may be called champion rows you first eliminate those rows that have failed to meet the requirements in growth. Some have germinated poorly, some have lacked in vigor and strength of growth, others have suckered abnormally; the ears have been produced too high up in some rows, and the per cent of standing plants at harvest time in others may be low. After discarding all such rows select eight or ten of the remaining which have given you the greatest yield per acre.

Performance of Both Parents.

Now the breeding ears for the next year's block having been selected from the eight or ten rows producing the greatest amount of corn per acre and per stalk, they are from standing detasseled plants which did not sucker or show a tendency for any undesirable features. In short, the dams of these ears have made an excellent record and these characters should reappear to some extent in the progeny. But we know only the performance record of one of the parents. To facilitate the development the influences of the sire must be controlled.

We have for planting this next year four rows of corn retained on the cob of the original breeding ears. Select the eight or ten that give you the best results in the breeding block; mate these ears in pairs or small isolated plots; plant some five rows from one of the ears and six rows from the other, alternating the rows, and detassel all the plants in the even rows. One of these ears is being used entirely as the sire. It produced all the pollen used in this miniature block. The other is used only as a dam and from its rows are selected the breeding ears. The kernels of these, we know, have been fertilized by a sire which the year before proved itself to be a champion.

The best of these ears just described are planted together in a multiplying plot from three to five acres in extent and one-third or one-half of the rows detasseled. From these rows enough seed can be secured to plant a large field. This corn now has a traceable pedigree on both sides. Its parents have annually been subjected to rigid tests as to yielding power and other good characteristics, and annually the liability of disastrous effects of self-fertilization has been eliminated. There are four or five of these multiplying plots in the same field. The amount of ground in each plot should be known and at harvest time each plot should be gathered by itself, making a division of the tasseled and detasseled corn. The product of each plot should be weighed and the rate of yield per acre computed. Here again we have a competitive test.

Seed for the General Field.

The seed for the general fields should be selected first from the plot giving the greatest yield, and then from the next, if you have not enough, and so on.

There is yet another and much more technical step to be taken which, I think, is hurrying the development and permanency of high-yielding power as well as other beneficial tendencies. In the second year, or mating block, there will be some individual plants that are undesirable as sire, yet these cannot be identified as such until after it is too late to prevent their pollenating some kernels on the dam rows. Of course in the detasseling season all apparently weak and undesirable stalks should be detasseled. But there will remain large, vigorous stalks that produce only nubbins. To be able to accurately identify parents of an ear the individual plants should be mated and the pollination of the ear performed by hand from a single apparently desirable sire. The pollination should be carried on between mated individuals as extensively as possible and a correct record kept of such crossing. The plants used as male, as well as those used as female, should be numbered and tagged in order that the performance of each sire can be identified.

It will require a great many of these crossings to procure even one good big ear that was pollinated entirely from a plant producing a good and heavy ear of similar type.

Upon our own farm we conduct fifteen of the large eighty-row breeding blocks, some fifty of the small mating blocks, and last year we made 600 individual crosses. We have identified at least twelve strains out of an aggregate of over 8,000 in four different varieties that annually head the list as to yield in their variety. Each year, of course, decreases the number of strains left in the race and increases the amount of seed produced by the remaining strains.

We devote some 250 acres to multiplying plots (on which eighty different strains are being propogated) and about 8,000 acres to the production of pedigree seed.

All of these strains must be kept in such a way that their identification is known.

American Citizens Are Buying Up the British Northwest Territory

(Copyright, 1906, by Frank G. Carpenter.)

WINNIPEG, Feb. 15.—(Special Correspondence of The Bee.)—There are now more than 200,000 Americans in the Canadian northwest. They number one-third of the population, and some sections of the wheat belt are settled almost entirely by them. A few American syndicates have taken up large tracts and some individuals have bought thousands of acres and are holding them, but the majority of our people have settled on the homesteads allotted by the government and, having purchased lands adjoining, are waiting to grow up with the country.

Americans are doing a large share of the business of the new towns. A few are merchants, others are investing in elevators and mills, and there are a number at Winnipeg who have much to say in the grain exchange and other financial centers.

The American Invasion.

Indeed, Canada may be said to have a real invasion of Americans. In 1896 less than fifty homesteads were allotted to them. In 1897 the number jumped to 1,000, and in 1899 it was 26,000. In 1900 it rose to 35,000, and last year more than 50,000 Americans, an army ten times as large as that which Xenophon led on the march to the sea, came over into Canada and are now here besieging the God of Prosperity.

The government officials tell me they expect to have 80,000 more Americans this year, and I warn you that both they and the American real estate syndicates, who are making money out of buying lands and selling them again, will do what they can to increase that number in the future. This is a matter of vital interest to the United States. It means the loss of some of the best of our farming population, and in addition the actual carrying away into Canada of millions of dollars of good American gold.

Uncle Sam Will Lose.

The most of the Americans who go to Canada are skilled farmers. They are men of means, and nearly all of them carry some money along. I am told that the average, so far, has been at least $1,000 per head, which for the 200,000 immigrants who have so far gone there would mean an actual loss of something like $200,000,000. If the average is kept up it means that Uncle Sam will lose $80,000,000 from such immigration this year, and that to say nothing of the energy, brains and muscle of 80,000 good American citizens. It is generally estimated that a first class man without a cent in his pocket is worth at least $1,000 to the country in which he settles, and our emigrants are certainly worth that to Canada. They are worth more in the building up of the country, for they know just how to handle it. They are valued at something like $1,000,000 a year by the railroads as traffic producers. James J. Hill estimates that every new family which settles along the Great Northern is worth at least $100 a year in additional freight. Now 50,000 Americans at even five to the family means 10,000 families; and at Mr. Hill's estimate this equals an annual increase of at least $1,000,000 to the receipts of the Canadian railroads.

Do you wonder that the Canadians are anxious to get us?

Movement Started by Yankees.

This remarkable invasion originated in the combined forces of the Dominion government and Yankee speculators, and it has been carried on by those forces from the beginning until now. Indeed, I might say that our real estate men were the real discoverers of the new Canada. The Canucks have long known that they have a vast area of good soil, but they had no idea how it could be developed until the strenuous Americans crossed the boundary and planned out the way.

To begin with, the movement is the outcome of the filling up of the United States. For years the American railways, which are always figuring after possible traffic, have known that they were carrying about 300,000 emigrants to our great west every twelve months. This army has been scattered over our country, and it has rapidly filled the vacant spaces. It has eaten up most of the homesteads given free by our government and has swallowed about all the cheap lands that could be had in large blocks. About 1900 the fact that the most of such lands were gone became well known, and the American pioneer farmer who had settled in Ohio and there made money by selling out and buying cheaper lands in Illinois, and again made more by moving from there on to North Dakota, found himself at the end of such speculation. Lands everywhere had risen, and in the far west they were worth from $15 and upward per acre.

At the same time the big land operators who had been buying large tracts in Minnesota and the Dakotas from the Northern Pacific and other railroads and selling them out to the farmers, found that there was no more land to buy, and that they would have to have new territory or quit the business. The farmers began to wonder what kind of lands there were in Canada, and our real estate men to search far and wide for new worlds to conquer.

Million Acres Sold by Americans.

Among these real estate agents were two who had made quick fortunes by buying our railroad lands and selling them. Their names were Robertson and Lynch. Robertson had started life as a country school teacher at $30 a month and Lynch had begun as a land surveyor at a few dollars per tract. The two discussed the situation and Robertson was sent to Canada to spy out the land. He came here in the winter and took trips from Winnipeg out over the different railroads visiting the small towns of the wheat belt and of the new country beyond. He would stop at a village hotel and engage in conversation with the farmers, asking as to their crops and the prospects. One man would tell him that he got twenty-seven bushels of wheat per acre that year, and, on being asked as to the year previous, would reply that he had made twenty bushels then, but that the year before he had gotten only fifteen bushels, as his crop had been a failure.

As Robertson heard this kind of talk his eyes bulged out so that they almost dropped upon his cheeks. He saw the possibilities of land speculation, for he knew the average yield in Minnesota at that time was not more than fifteen bushels per acre. When he learned that the men held their farms at only about $10 per acre he was still more excited. He heard the same stories at other villages and when he returned to Winnipeg he called upon Mr. Griffin, the Canadian Pacific railroad land commissioner, and told him that he wanted to buy 50,000 acres along the Soo Pacific, which comes into Canada from the United States and joins the Canadian Pacific trunk line a short distance above the boundary.

As the story goes, Mr. Griffin was not at all anxious to sell. I am told he looked upon Robertson as crazy, and advised him to purchase the lands through the local real estate agents. This was done, and it created such a sensation in Winnipeg that the agents employed by Robertson were accused of unmercifully skinning a poor American. At all events, the land was soon purchased, and within four months it was all sold for $10 per acre. A short time after that Robertson and Lynch came to Canada and bought 1,000,00 acres of the Canadian Pacific railroad grant, in the western part of Manitoba, and in what is now lower Saskatchewan. They paid, I am told, less than $3 per acre. That was four years ago and their land has all been sold. They have let the land go at all kinds of prices, but it is said that the average has been at least $6 per acre, and that they have made in all probability $2,000,000 out of the deal.

Lucky Real Estate Dealer.

About this same time another Minnesotan bought a big tract of land and disposed of it at a profit of millions. This was Colonel Davidson of Duluth, who had made much money in buying Minnesota lands and selling them. Colonel Davidson went into Canada to buy some cattle for a farm he had in the United States. He made inquiries as to the crops and saw the possibilities of land speculation. In looking about he found that the Qu' Appelle Long Lake & Saskatchewan railroad had 1,000,000 acres which they were anxious to get rid of. The railroad company had received the land as a concession for building the road, with the provision that it was to be good farming land. They did not understand the soil, however, and were so disgusted with their grant that they wanted the dominion government to take it back and allot them something else. The road itself was almost bankrupt. It consisted of little more than two streaks of rust and a mortgage, with a stray settler here and there along the line. When Colonel Davidson offered to take the grant off its hands at $1 cash per acre the owners fairly tumbled over themselves in their rush to accept. Davidson first got the sale confirmed by the dominion government, and then brought in a trainload of bankers and capitalists from the United States. He took them over the tract and showed them the land. I am told that he sold one-fourth of it on the train, and that within a year the whole of his 1,000,000 acres had been disposed of. As to his prices, I understand

American Woman Agent.

that he started at $4 per acre in big blocks, and that quarter sections were retailed at $6 per acre and more.

Since then these same men and others have gotten possession of land grants belonging to the various railroads, and they have sold some millions of acres. Indeed, the most of the land selling has been done by Americans. This is especially so with the large tracts. There are also Canadian real estate agents, but the most of them are doing business in the small.

Indeed, one of the chief businesses of the new Canada is selling lands. The real estate agent is found at every station. He meets you as you step from the cars. You see his sign in the samples of wheat, oats, potatoes and other products in his office windows, and you may find farm exhibits even at the depots.

Take, for instance, Moose Jaw, at the junction of the Soo Pacific and the Canadian Pacific railroads. It is a lively city of 4,000 souls, and the liveliest part of it is the railroad depot. Just outside the station buildings a pyramid has been erected of sheaves of oats, wheat and barley, with a Canadian flag floating over it. The pyramid is made up of samples of the grain grown in the vicinity and they are so displayed that they can be seen from the cars. We had a wait of twenty minutes at Moose Jaw, and I stepped off and walked about. As I stood before this pyramid a fine-looking American woman of 40, with a buxom, rosy-cheeked girl of 16, drove up in a buggy. Both women were clad in furs and the cheeks of the girl shone like jacqueminot roses. The woman accosted me, asking if I were about to settle in Canada, and if so did I not want some choice lands. I replied that I had not fully decided, whereupon she continued:

"Well, I can tell you, sir, that there is no better soil than right about Moose Jaw and that I have the best of all left in the neighborhood. I have a few choice pieces that I want to sell, and if you care to look I will drive you out into the country. That is my sign!" And she thereupon pointed to a billboard tacked up beside the straw stack saying that Mary Jane —— bought and sold lands.

I asked her where her lands were and she told me, saying that they were worth from $18 to $30 and that they would produce forty bushels of wheat, ninety bushels of barley or 120 bushels of oats to the acre.

"But," said I, "I am afraid it will be too cold. I understand you people freeze to death in the winter."

"As to that," said the madam, "I am an American woman, who came here for my health from Colorado a good many years ago. Suppose you take a look at my daughter, who sits here beside me. She is 16 years old and I have never paid a cent for doctor bills on her account. Do either of us look like freezing to death? No, sir, we have a few cold days in the winter, but as a rule our climate is better than that of the northern parts of the United States."

I then told the madam that I was a newspaper correspondent and not a land purchaser, whereupon she handed me her card, saying: "Well, I would like to interest you in our lands, and, if you see any one who wants to buy, send him to me—I mean any man with good hard cash. Send your card along with him, and if he buys you will get your commission." With that she drove quickly away to accost another stranger who had come out of the station.

American Settlements in Canada.

During my travels here I have visited many of the localities where Americans have settled. They have come to Canada in all sorts of ways. Some were brought by the trainload, by the real estate agents and the government, almost depopulating the little farm communities of our country from whence they came. Iowa, for instance, has fallen off 10,000 or more through this and other immigration. Some of the settlers had crossed the boundary in canvas-covered wagons and others had driven into Canada in all sorts of vehicles. I have photographs of men who came in using oxen and horses to pull their effects, and of some who plodded along for days with ox teams on the way.

The first Americans to arrive squatted down close to our boundary, getting homesteads and buying farms along the Soo Pacific railroad. Soon afterward they began to take up the lands farther west, and now fully 70 per cent of all the settlers between Moose Jaw and the international boundary are Americans. They own a line of wheat farms extending on each side from the railroad back far into the country. Their homes remind me of the settled portions of North Dakota, and they have many good little towns such as Weyburn, which has 1,200, Milestone 600, and others. In such towns the business men are chiefly Americans.

Another line of American settlements has grown up along the Prince Albert branch of the Canadian Pacific railroad and others along the Canadian Northern. It is on the Canadian Pacific branch that Davidson got his cheap lands and resold them. As it is now there is a continuous line of unbroken wheat fields running from fifty miles above Regina to Rosthern, a distance of 170 miles. Ninety per cent of the lands along that road are owned by Americans, their farms extending back from the track for about twelve miles on either side. Some of the farmers are homesteaders, many of whom bought the lands adjoining them, so that they each have all the way from 320 acres up to 5,000 acres. They are building comfortable houses and good barns.

Don't Want Homesteads.

Some of the Americans will not take up homesteads, although they can get the land for living on it. They prefer to buy rather than relinquish their allegiance to the United States. Every homesteader has to become a naturalized Canadian before he can have a clear title to this free land. If he buys, however, he can get a title upon paying the money, and as the outsiders have about as many rights as the Canadian, with the single exception of being able to vote or run for office, a large number of our citizens are Americans still.

Within the last year the Canadian Northern has been pushed through the wheat belt to beyond Edmonton. There are Americans settled along that line, and it is probable that some of those who come this year will take up settlements between Edmonton and the Rockies, toward which the Canadian Northern is building. The latest colonies are along the line of the Grand Trunk Pacific, and, indeed, there are Americans in every part of the New Canada. In another letter I will show the effect that this large American influence is likely to have upon the future of this great region.

FRANK G. CARPENTER.

Changed His Luck

It is told of Schliemann, the exhumer of buried cities of the ancient world, that he was pursued by ill luck in his earlier undertakings. Mentioning the fact to a friend the latter asked him which leg and arm he first inserted in trousers and coat. Schliemann said he habitually inserted the right. "That is the cause of your misfortunes," said his friend. "You have offended the left hand fairies and they take out their vengeance on you. Reverse your habit and see." "And," said Schliemann, in telling the incident in his later and prosperous years, "you see how it changed my luck."

ON THE WAY TO THE SASKATCHEWAN.

MR. CARPENTER GREETS A FINE-LOOKING WOMAN.